Port Automation and Major Issues

Capacity building workshop on sustainable port development and improving port productivity among ESCAP member countries

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What is Container Terminal Automation?

- Container terminal automation – use of robotized and remotely controlled handling systems along with the transition from manual to automated process
- It is the frontier for implementing digitalization and smart port
- It makes it possible to reduce human intervention in industrial activities, allowing for a higher control of the equipment and processes involved
- It eliminates uncertainty in response time and reduces in operational cost and human errors
Trends in Container Terminal Automation

- Gates: Singapore, Busan (RoK), Yangshan (Shanghai, China) etc.
- Yards

Type of Automated Container terminal

<table>
<thead>
<tr>
<th>Type</th>
<th>Automated Zone</th>
<th>Major terminals</th>
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<tbody>
<tr>
<td>Fully automated terminal</td>
<td>Discharging from ships: manned operation</td>
<td>CTA in Germany</td>
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<td>Unmanned AGV</td>
<td>ARTGC</td>
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<tr>
<td>Semi-automated terminal</td>
<td>On-land discharging: unmanned operation</td>
<td>Manned operation</td>
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<td>Manned Y/N</td>
<td>ARTGC</td>
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- Quay cranes: Xiamen (China), Qingdao (China) etc.
Status

- Container terminal automation is still at relatively early stage 97% of the world container port terminals are not automated.

- The share of container that are fully automated is 1%, while semi-automated terminal account for 2%.

UNCTAD’s review of maritime transport, automation can play a significant role in increasing ports’ efficiency and productivity. In the same time, it can also reduce operational costs.
The potential of automated container terminal in the Asia and the Pacific region

Asia and the Pacific region held the largest size of the automated container terminal market in 2017.

- Rapid industrialization
- Increasing maritime trade
- Growing investment in ports and terminals

Source: Industry Experts, Secondary Research, and MarketsandMarkets Analysis
Why Container Terminal Automation?

- Predictability and Reliability: define the operational conditions (container and vehicle type limitations due to labour conditions etc.)
- Adapt prevailing conditions (labour cost, personnel safety, carbon emission etc.)
- Boost competitive power in the future
- Avoid additional test (which can cause delays and cost overruns): short stays of the ships at the container terminal
- 24 hours operation
- Adapt the production schedule to the capacity of the mechanical supplier and the method of delivery of the cranes
- Confirm the design and the number of required vehicles and cranes by using simulation technology
- Continuous monitoring and improvement
Stories of Automation Container Terminal

Qingdao New Qianwan Container Terminal
• 2 fully automated berths stretching 660 meters of its quay
• 7 ship-to-shore cranes, 38 automated stacking cranes, and 38 AGVs

Shanghai Yangshan Deep Water Port
• 7 additional berths
• 26 bridge cranes, 120 rail-mounted gantry cranes
• 130 AGVs
Challenges/Issues: Internal & External factors

**Internal: Disturbance and disruption factors**

- The quay of arriving containers and/or twist locks cannot be guaranteed
- It may be impossible to automatically identify containers due to illegible ID number
- Automated truck identification may suffer from low hit rates or similar reasons
- A truck/chassis appears to be different than expected
- Loading sequence is disrupted due to vehicle break-down, wrong container weights
- Stowing groups are filled different than planned due to new information
- Truck drivers and/or operators may not behave as expected, and disrupt the automated process
- Equipment breakdowns

**External: Disturbance and disruption factors**

- Labour dispute
- Environmental protection issue
- Investment/financing
- Governmental policy
- Integrated transport connectivity

**Solution**

- Contingency plans (manual decision, human intervention, instrument update)
- Government, labour and enterprises discussion and cooperation
- Public-private partnership (PPP)
What should we do?

- Provide exchange knowledges planform
- Monitoring and evaluation
- Improve collaborations
- Significant investment
- Clear roadmap and relevant policy support
- ESCAP
- Government
- Container Terminal Automation
- Private Sectors
- Observation
- Cooperation
- Investment
Thank you